

## Effects of the Bior Remedy on the Trypsin-Antitrypsin System and the Productivity Indexes in Broilers

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**Abstract.** Today the increasingly spreading interdiction to use hormones, growth stimulators with antibiotics, and genetically modified products for maintaining the health and productivity of animals and poultry compels forage and drug producers and owners of animals to search for other strategies for the optimization of the performance characteristics, protection of environment, improvement of product quality, and for ensuring the best general condition of animals possible. Thus, this study aims at determining the influence of BioR remedy obtained from *Spirulina platensis* on broilers.

The experiment involved 4 lots of 30 broilers each, from the 2nd day of life. 3 experimental lots received intramuscular injections of BioR in different doses, 2 times in a row: on the 2nd and 21st day, and the 3rd lot was injected for the 3rd time as well – on the 34th day after eclosion, while the broilers from the control lot were injected 0,15 and, respectively, 0,5 ml serum. For the biochemical test blood was collected from 5 broilers on the 2nd day before injecting BioR and on the 43rd day before slaughter from 5 broilers from each lot. The biochemical study carried out on young broilers treated with BioR before slaughter has revealed correction properties of the trypsin-antitrypsin system – results which were also confirmed by higher bioproductive indexes in experimental lots.

**Key words:** BioR remedy, *Spirulina platensis*, broilers, trypsin – antitrypsin system,  $\alpha_2$  – macroglobulin, productivity index .

### INTRODUCTION

Industrial aviculture in the Republic of Moldova is the most stable, dynamic, and multilateral agro-industrial branch in the Republic of Moldova, which, in a relatively short time after the transition period, managed to reanimate the production of meat and eggs thus ensuring the food security of the country.

Due to the interdiction of antibiotics in combi forage [starting with 1 January 2006 in the EU], specialist literature shows that, both nationally and internationally, the complex scientific opinion and issues are increasingly posed around the elaboration, testing, and use of various ecologically pure remedies for humans, animals, and the environment; in the veterinary sector – especially for increasing the adaptive capacities, bioproductive performance characteristics and, last but not least, for preventing the consequences of technological stress in animals and poultry [4, 5, 12, 13, 18].

It is known that the most promising of the wide range of phyto-genous products are the microalgae [ 9, 10, 11]. The interest for microalgae is caused not only by the importance of their bioactive components, but also by the fact that these microorganisms allow the adjustment of various physiological and metabolic processes and, obviously, the production of remedies obtained from a steered synthesis of microalgae, especially of spirulina [1, 9, 16].

After a study of the specialist literature it can be said that the BioR remedy obtained from *Spirulina platensis* is the most studied remedy of algal origin, on laboratory animals, farm animals, and humans [2, 4, 5, 7, 9].

The above-stated encouraged us to start a series of studies with the purpose of highlighting the influence of the BioR remedy on health, productivity, and certain biochemical indexes which show the functional condition of the pancreas and catabolic processes in young broilers.

## MATERIALS AND METHODS

The research involved 150 2-day broilers, divided into four lots having 30 2-day broilers in the conditions of Avicola Shaver poultry farm located in Bucovat, Republic of Moldova. The study of the use of the BioR product was organized and carried out as shown in Table 1 below.

Table 1

Diagram of injection of the BioR remedy to young boilers

Broiler lots	Number of chicken	Injection schedule	Dose, ml		
			1 time	2 time	3time
Experimental 1	30	2 times on the 2nd and 21st day, and to the 3rd lot – a 3rd time on the 34th day	0,1	0,4	-
Experimental 2	30		0,2	0,8	-
Experimental 3	30		0,15	0,6 ml	1,0 ml BioR
Control	30		0,15 ml 0,9 % sol. NaCl	0,5 ml 0,9 % sol. NaCl	-

The BioR remedy we tested on young broilers is of algal origin, was obtained through biotechnological means from the alga *Spirulina platensis* CNM-CB-02, and is patented in the Republic of Moldova [8]. This medical drug (BioR) contains a complex of biologically active substances like amino acids, especially immunoactive amino acids, phycobiliproteins (Phycocyanin C), oligopeptides, carbohydrates, mucopolysaccharides, trace elements, etc.

For the biochemical test blood was collected from 5 broilers on the 2nd day of life before injecting BioR, and at the end of the research – on the 43th day before slaughter, from 5 broilers from each lot). The speed of growth, development, and evolution of bioproductive parameters was assessed by individual weighing of young broilers. The activity of trypsin, values 2 – of macroglobulin and 1 – of antitrypsin, were determined through methods put together by Kareaghina M.D. and applied according to techniques adjusted for the use of the biochemical analyzer FP-901 (Labsystems, Finland) described in [3].

## RESULTS AND DISCUSSIONS

The BioR remedy of algal origin obtained from *Spirulina platensis*, multilaterally tested on poultry for a period of approximately 40 days in poultry farm conditions did not cause any adverse reactions or other development or health deviations in young poultry.

Table 2

Values of the trypsin-antitrypsin system in the blood serum of young broilers treated with the BioR remedy

Broiler lots	Number of broilers	Trypsin, nmol /s. l.	Antitrypsin, mkmol/ l	2- macroglo- bulins, g/ l
At the beginning of the study	5	72,42±3,03	47,80±1.35	4,77±0,24
Control	5	69, 90±2,90	49,88±2,05	3,27±0,15***
Experimental 1	5	71,56±3,68	36,62±4,22*	3,71±0,46
Experimental 2	5	67,0±4,58	40,26± 1,25**	3,78±0,09*
Experimental 3	5	69,14±4,85	36,86±3,78*	3,85±0,42

Note: \*p < 0,05; \*\*p<0,01; \*\*\*p<0,001

After studying specialist literature we can state that we were the first to investigate the BioR remedy on poultry in different doses and injection schedules [7, 14]. The multilateral study of this drug and of its influence on the cell metabolism is therefore important, especially on the proteolytic function of the exocrine pancreas, and the investigation of the protection provided by the trypsin-antitrypsin system, which shows the health condition and the bioproductive indexes, especially the changes the body suffered after the intervention of stressogenous factors [15]. The biochemical results determined with regard to the trypsin-antitrypsin system before injecting the BioR products and at the end of the study, are shown in Table 2.

Table 2 shows that the average basal level of trypsin in the blood serum of poultry, on the second day after eclosion, before the injection of the drug tested, is 72,42±3,03 nmol/ s.l., a value which slightly decreased with age in all the lots involved in the study. Similar tendencies of trypsin with age were recorded in young pigs [5]. The results obtained show that the level of trypsin in the blood serum of young broilers on the 43rd day, before slaughter, does not differ from the lots examined, which is an indicator of a good maintenance and physiological and metabolic condition of poultry involved in the study.

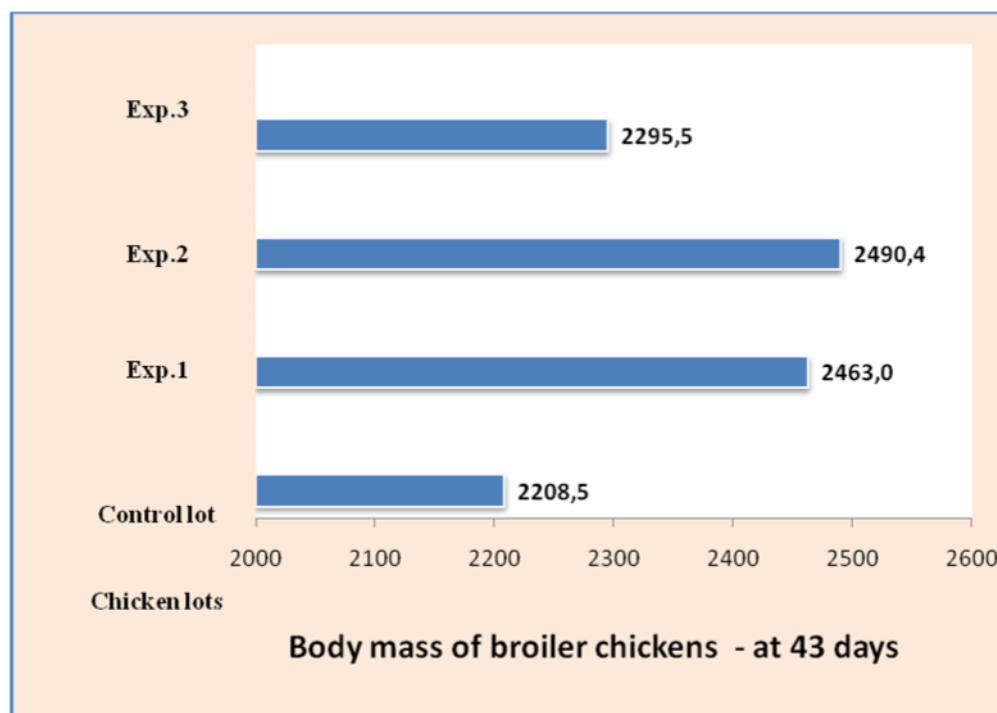
It is already well known that proteolytic enzymes play an important role in the regulation and control of functions of organs and tissues only in strict correlation with their inhibitors – a complex process which greatly depends on external and internal factors [15].

The results obtained and presented in Table 2 show that the level of serumal antitrypsin 1, does not clearly manifest itself with age in broilers of experimental lots. At the same time, after analyzing the data of Table 2 we can highlight the fact that the value of the parameter studied is lower by 19,3 – 26,6% as compared to the reference lot at the end of the study in all experimental lots treated with BioR – a fact which, probably, speaks about an adequate reactivity in broilers from experimental lots and allows physiological processes involving proteolytic enzymes. This hypothesis may also be confirmed through the manifestations of the trypsin-antitrypsin relation which is higher by 21,4 -35,7% in experimental lots. Similar results as regards manifestations of antitrypsin 1 and the trypsin-antitrypsin relation were obtained by other scientists who also found such results in studies on young pigs whose mothers were treated with BioR [5].

Protein 2 – macroglobulin plays a significant role in the antiproteolytic protection inherent of the trypsin-antitrypsin system, as it helps to obtain extensive information about the physiological and metabolic condition of animals in different maintenance and breeding situations [5, 6, 15]. An analysis of the results shown in Table 2 confirms the fact that the basal level of 2 – macroglobulin at the beginning of the study made up  $4,77 \pm 0,24$  g/l, an index which decreases by 45,9% in the blood serum of intact poultry with age.

According to Table 2, the BioR remedy prevents this index from falling with age in all experimental lots by 13,4-17,7% as compared to the reference lot, a significant difference being signaled in the experimental lot as well 2 ( $p < 0,05$ ). A similar tendency of manifestation of serumal 2 macroglobulin in animals, after the injection of bioactive drugs made of microorganisms and algae, were observed by other scientists as well [5, 9]. Thus it was established that the bio-drug tested has the property of inducing the synthesis of 2 macroglobulin in the poultry of experimental lots, a fact which can be regarded as a beneficial one, taking into account the role of this protein in the fixation and removal from circulation of trypsin and other proteases, as well as through the multifunctional activity of 2 macroglobulin which acts as a modulator of biological responses [6, 17]. A synthesis of the data obtained shows that the BioR made of *Spirulina platensis*, tested on young broilers in poultry farm conditions improve the trypsin-antitrypsin system in young poultry.

An additional argument for the favorable action of the BioR drug on poultry are the results concerning its influence on the productivity characteristics. Picture 1 graphically presents the weight of 43-day broilers, before slaughter.



Pic.1. Weight of broilers from the 4 experimental variants

Data shown in Picture 1 reveal that, during the whole period of growth, the best results were signaled by the broilers from the experimental lot. Thus, at the end of the study the weight of broilers from experimental lots was higher by 87,0g – 281,9 g (3,9- 12,8%) as compared to the control lot. At the same time, the mean increment a day during the entire

experimental period in lots treated with BioR was by 54,7- 59,5 g or by 3,8- 12,9% higher as compared to the reference lot.

The experiment carried out on poultry in ground conditions proved that the BioR remedy obtained from Spirulina shows adaptive and anti-stress properties based on the improvement of the trypsin-antitrypsin system in poultry during growth and maintenance in stressful poultry farm conditions, which is confirmed by the superiority of bioproductive indexes in broilers treated with BioR.

## CONCLUSIONS

- The BioR remedy obtained through modern technologies from Spirulina platensis, tested in poultry farm conditions for approximately 40 days, is very well tolerated locally and generally.
- It was experimentally established in production conditions that intramuscular injections of BioR applied to broilers in the first days of life has beneficial effects on the trypsin-antitrypsin system.
- The BioR remedy injected to young broilers shows beneficial effects on bioproductive indexes confirmed by a weight and daily mean increment higher by 3,8 - 12,9 % as compared to the reference lot.

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